

Unit 2

EQUIPMENT



Words of Experience



Click icon to hear firefighter story about pumps.



Objectives

- 1. Distinguish the differences between the two cycle and four cycle engines, and identify which one of these differences is most important to a pump operator.**
- 2. Label the parts of a commonly used portable pump.**

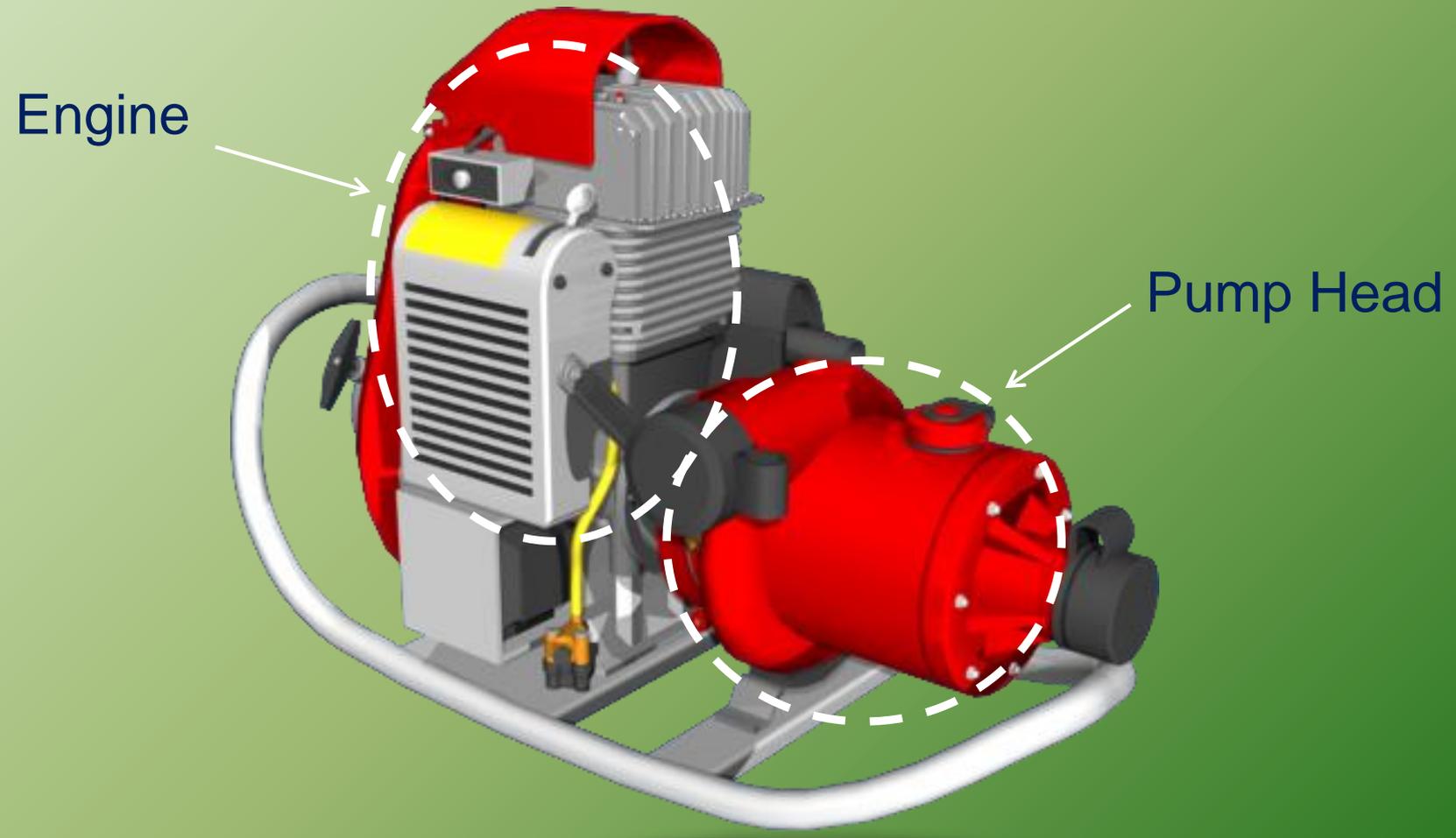
Objectives

- 3. Identify the purpose of a suction hose and a discharge hose.**
- 4. Match types of wildland fire appliances and tools with their respective purpose.**
- 5. Identify nozzle types.**
- 6. List one type of national portable pump kit.**

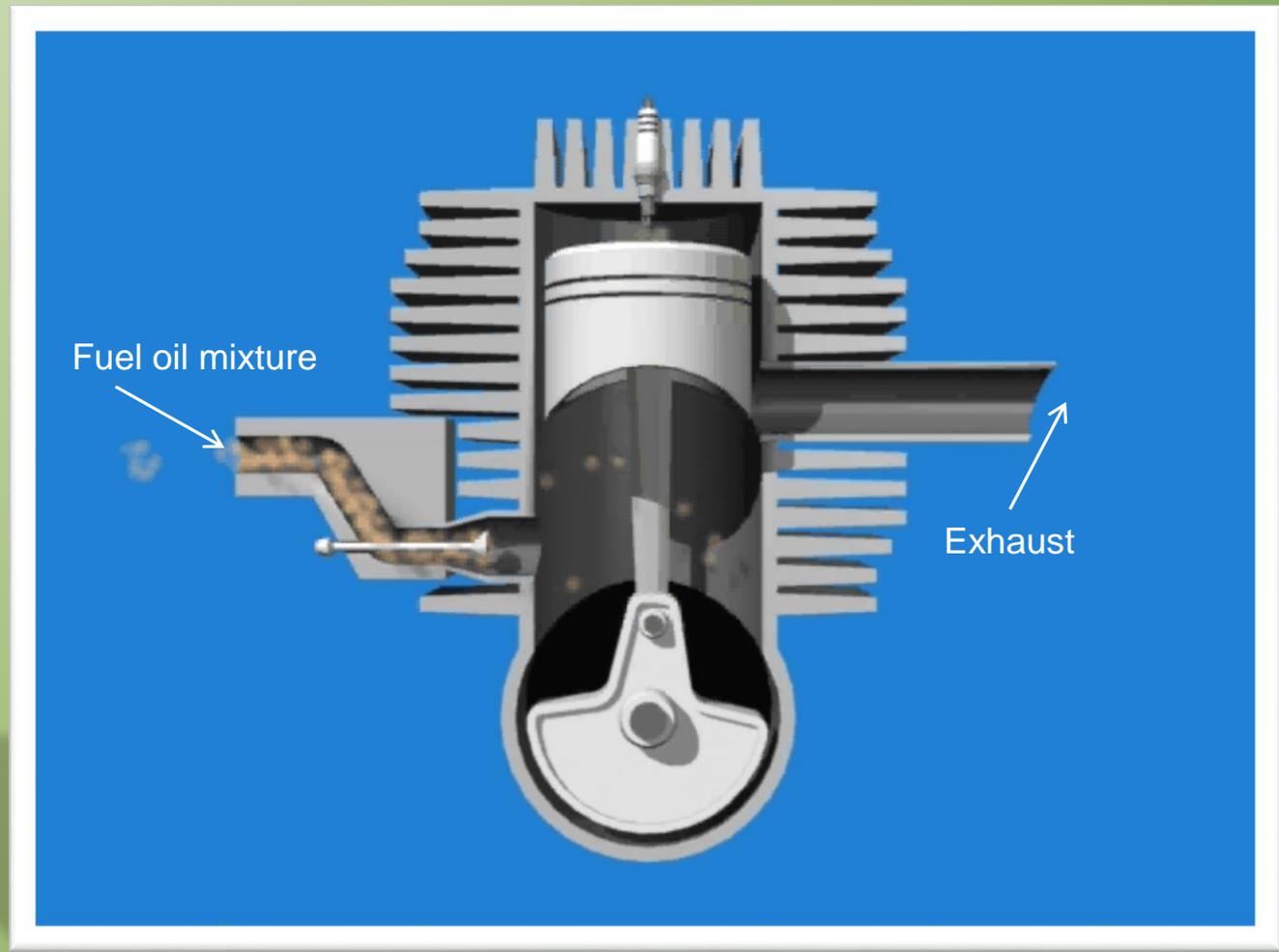


PORTABLE WATER PUMPS

How Pumps Work

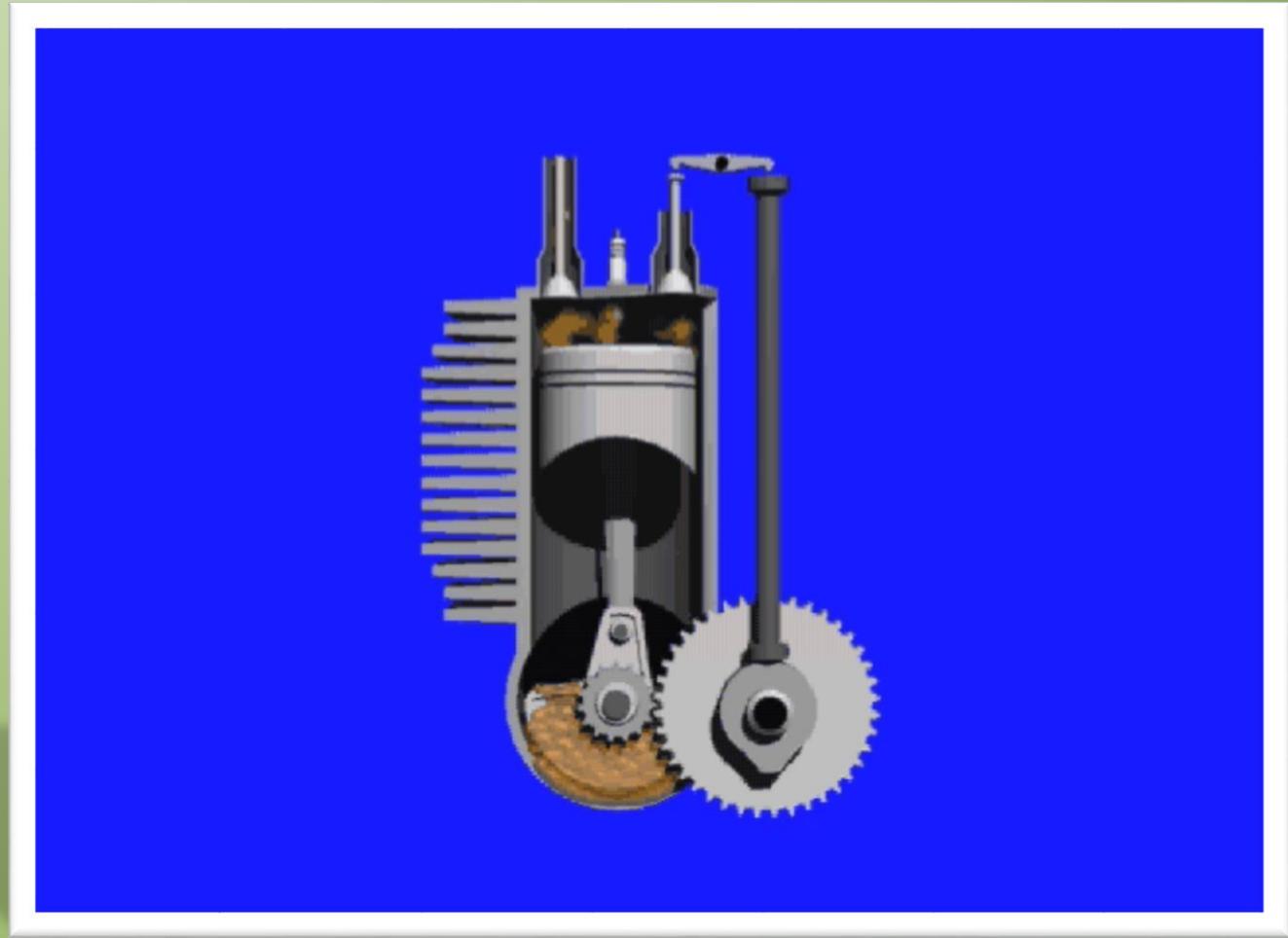


Types of Engines – Two Cycle



Click on image to play animation.

Types of Engines – Four Cycle

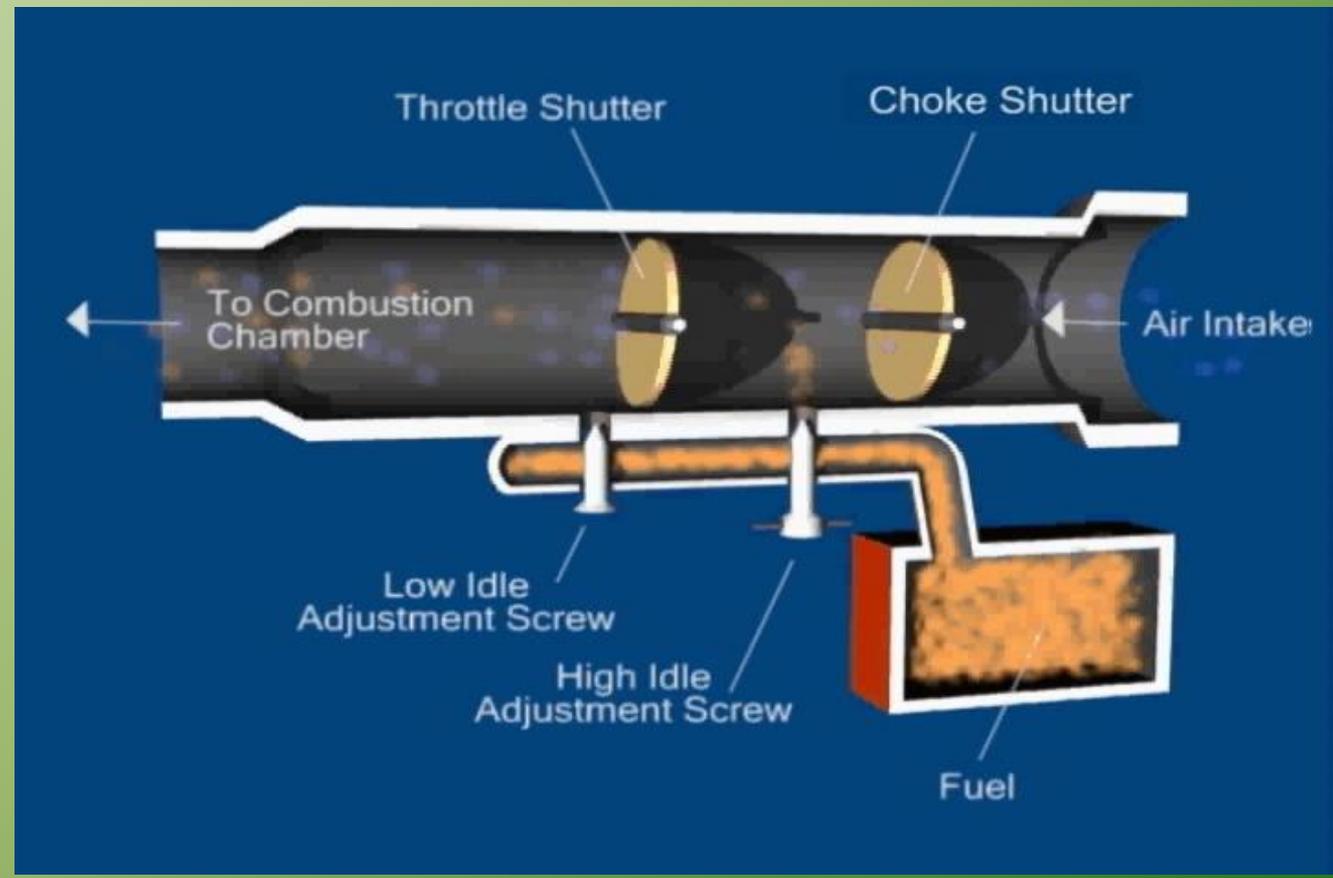


Click on image to play animation.

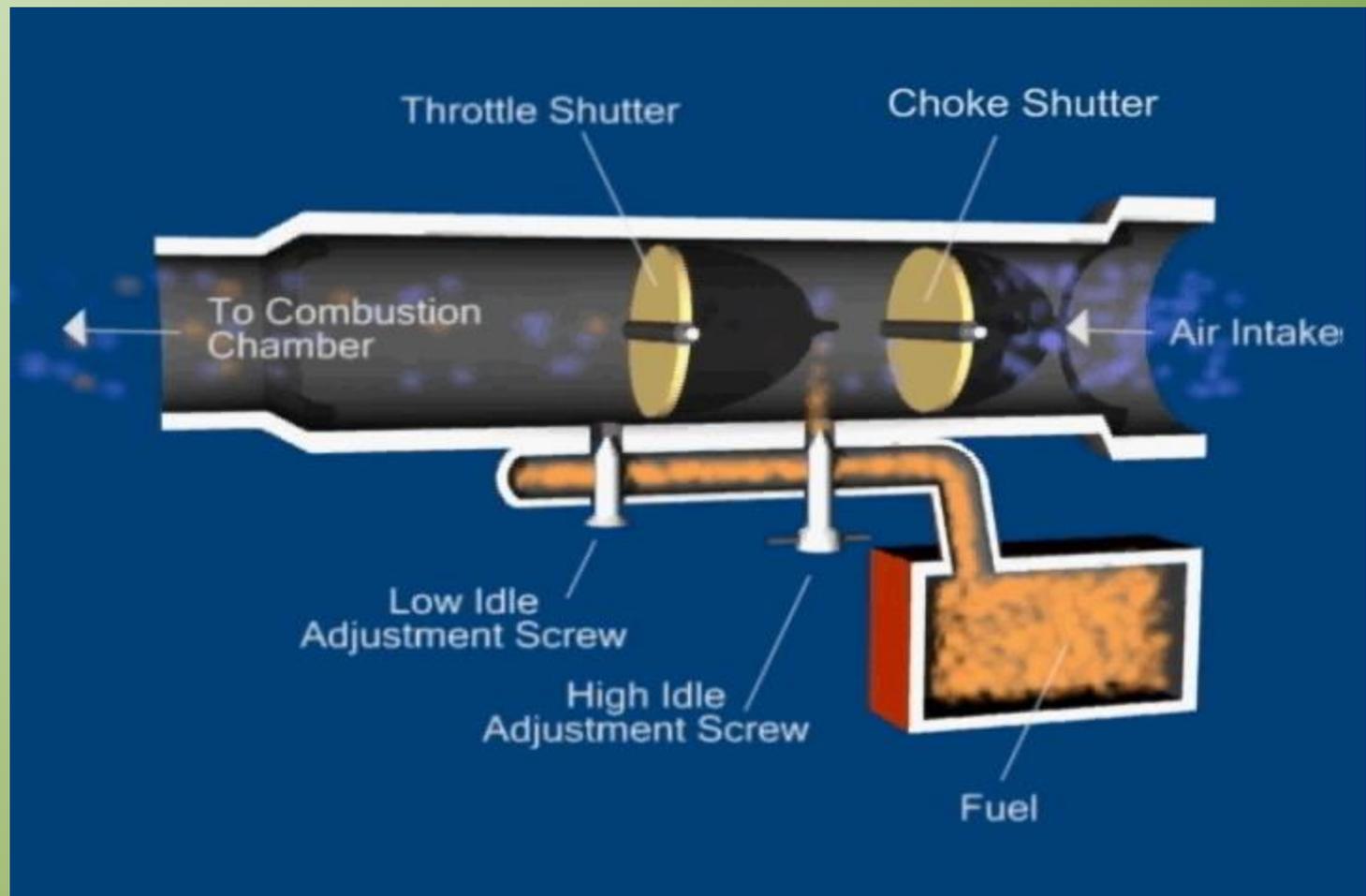
Differences – Two Cycle and Four Cycle

Factor	Two Cycle Engines	Four Cycle Engines
Lubrication (very important)	Oil is mixed with the gas; engine runs on two cycle oil mixed with unleaded gasoline.	Has a separate oil reserve and lubrication system; runs on unleaded gasoline (gas is NOT mixed with oil).
Weight	Typically lighter weight.	Typically heavier weight.
Fuel Efficiency and Exhaust Emissions	Typically less fuel efficient and produces more exhaust emissions.	Typically more fuel efficient and produces less exhaust emissions.
Orientation	Can operate in any vertical orientation.	Can only operate on relatively level surfaces due to the location of the oil reservoir and the need for the engine to draw oil from this reservoir to the top of the engine.

Carburetor

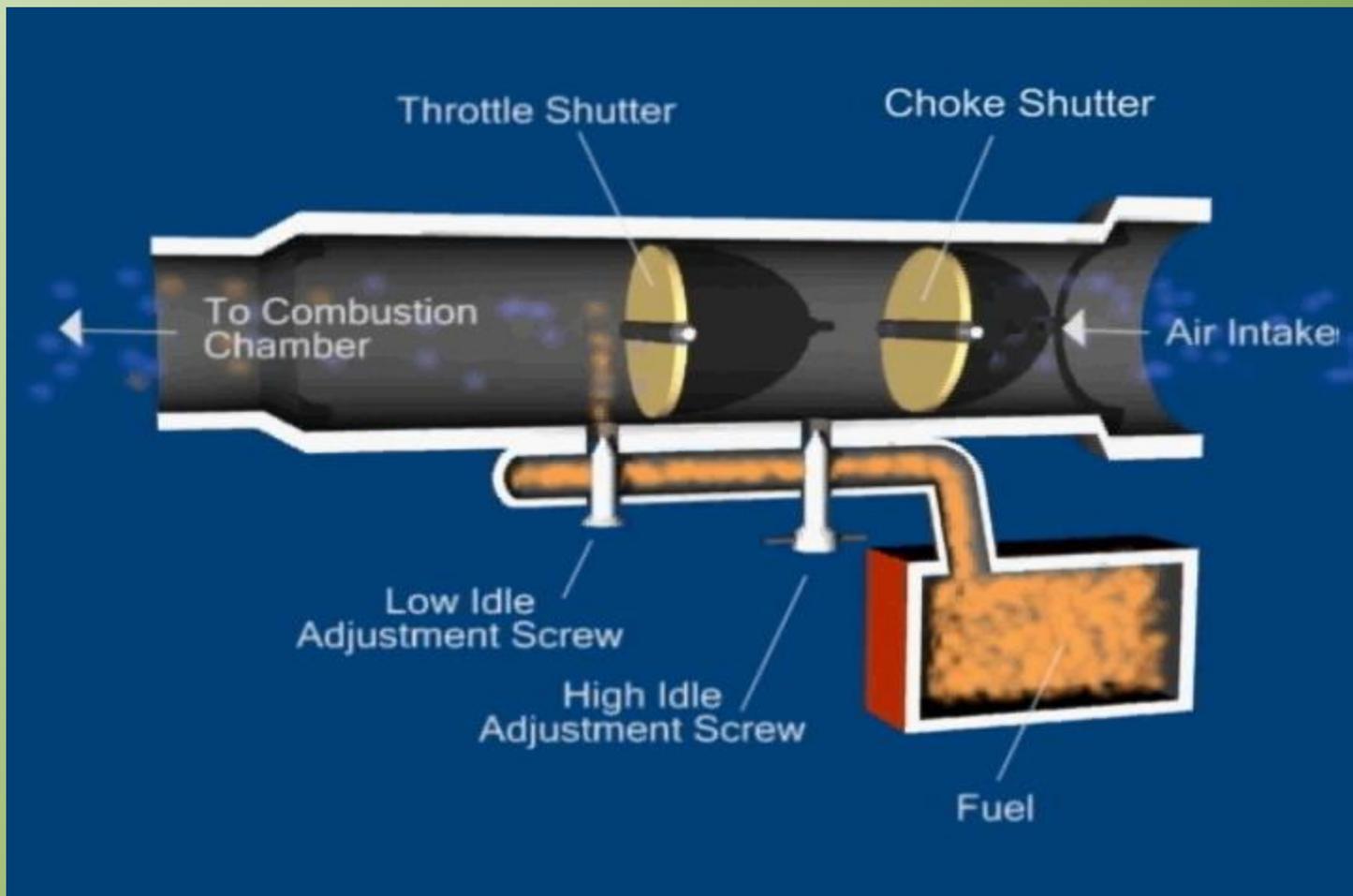


Carburetor - Starting Engine



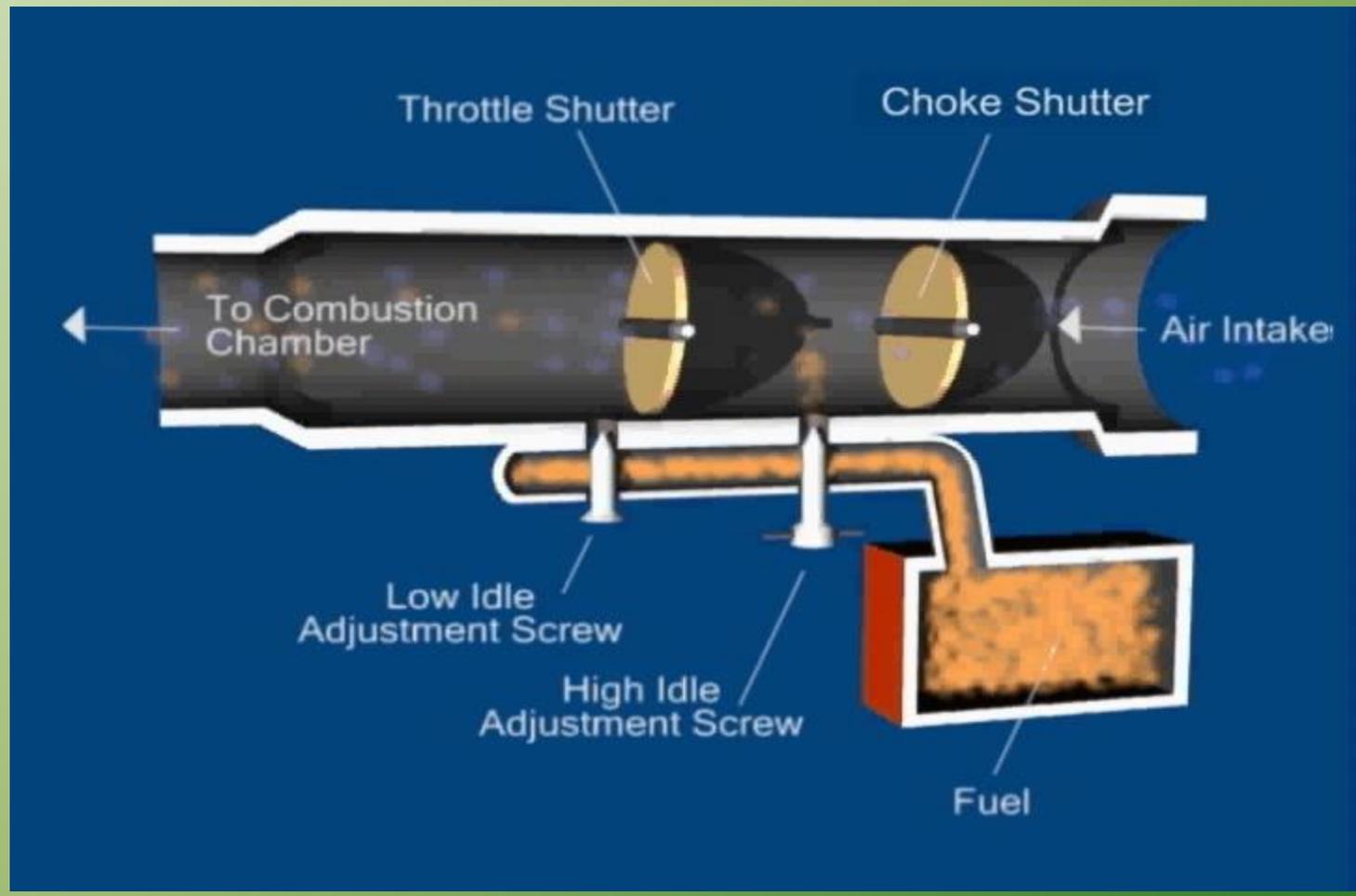
Click on image to play animation.

Carburetor – Engine Idling



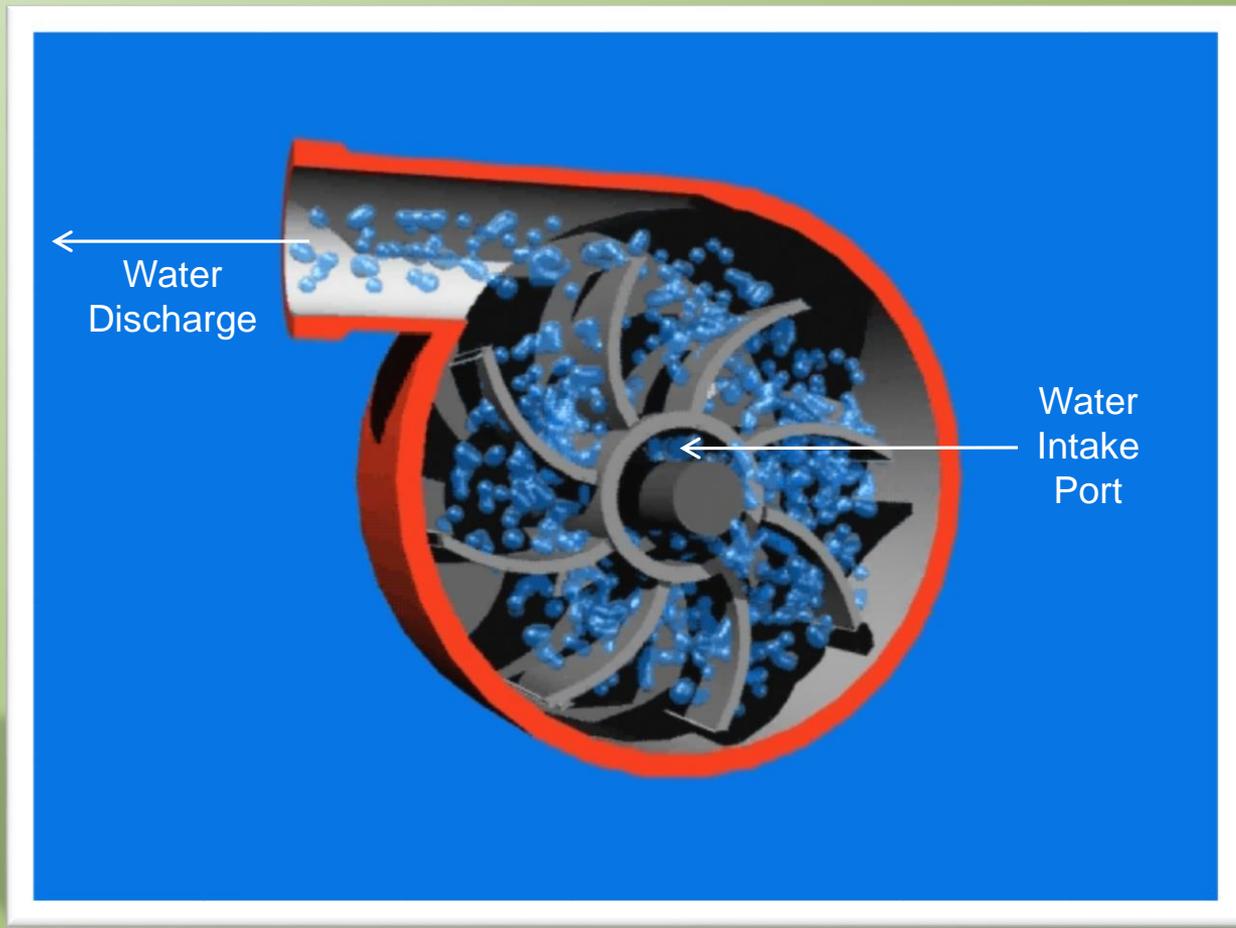
Click on image to play animation.

Carburetor – Engine Running at Full Throttle



Click on image to play animation.

Pump Head



Click on image to play animation.

Parts of a High Pressure Pump



Click on the image above to launch the interactive application.
Click “OK” if Microsoft Office asks you to confirm opening the executable file.
If for some reason the link to the application is broken, look for the file named “M3_Pump360.exe” in your Unit 2 PowerPoint folder, and double click on it to launch the interactive program.

Types of Portable Pumps

Lightweight Pump



High Pressure Pump



Floatable Pump



Portable Pump Performance – National Cache Pumps

Pumps	Pump Pressure (PSI) and Gallons Per Minute (gpm)								
	Free flow	50 psi	100 psi	150 psi	200 psi	250 psi	300 psi	350 psi	400 psi
Wildfire Mark 3 ^{a,b} (High Pressure Pump)		89 gpm	78 gpm	65 gpm	52 gpm	38 gpm	25 gpm	9 gpm	0 gpm @ 380 psi ^d
Wick 375 ^b (High Pressure Pump)	90 gpm	84 gpm	78 gpm	65 gpm	48 gpm	32 gpm	18 gpm	3 gpm	0 @ 360 psi ^d
Waterous Flotopump HP ^b	60 gpm	56 gpm	42 gpm	20 gpm	0 gpm @ 175 psi ^d				
Shindaiwa GP-45 ^c (Lightweight Pump)	66 gpm	n/a	0 gpm @ 65 psi ^d						
Wildfire Mini Striker ^c (Lightweight Pump)	56 gpm	32	0 gpm @ 85 psi ^d						
Honda WX10 ^c (Lightweight Pump)	37 gpm	n/a	0 gpm @ 51 psi ^d						
Honda WX15 ^c (Lightweight Pump)	72 gpm	n/a	0 gpm @ 54 psi ^d						
Wick 100-4H ^b (4 stroke) (Lightweight Pump)	69 gpm	36 gpm	0 ^c gpm						
Wick 100G ^c (2 stroke) (Lightweight Pump)	71 gpm	40 gpm	0 ^c gpm						

- a) Mark 3 pump performance in IRPG does not correspond directly with the values in this table. Pump flows are normally given in 50 psi increments; the performance information in the IRPG is reported in 10 gpm increments.
- b) Performance data obtained from Water Handling Equipment Guide (PMS 447-1 dated October 2003).
- c) Performance data obtained from manufacturer's literature.
- d) Pump shutoff pressure is the maximum pump pressure (psi) with the discharge closed (no flow or 0 gpm).

High Pressure Pumps

- **General description**
- **Weight**
- **Fuel**
- **Pump performance (gpm and psi)**

Move to next slide to view chart.



Portable Pump Performance – National Cache Pumps

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Floatable Pumps

- **General description**
- **Weight**
- **Fuel**
- **Pump performance (gpm and psi)**

Move to next slide to view chart.



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Lightweight Pumps

- **General description**
- **Weight**
- **Fuel**
- **Pump performance (gpm and psi)**

Move to next slide to view chart.



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HOSES

Types of Hoses

Suction (Intake) Hose:
Designed to handle vacuum.



Discharge Hose:
Designed to handle pressure.





APPLIANCES, ACCESSORIES, AND TOOLS FOR HOSE LAYS

Fittings



**Thread
adapter**



Reducer



Increaser

Fittings



Double female



Double male

Fittings



Plain wye



Siamese wye

Valves



Gated wye valve



Siamese gated wye valve



Hose line tee with valve

Valves



Check and bleeder valve

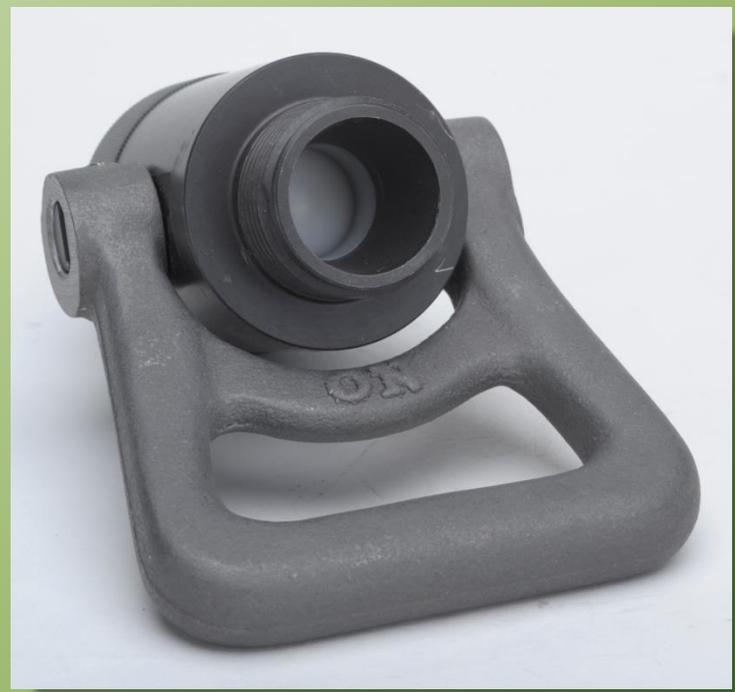


in use



Pressure relief valve

Valves



Ball valve

Intakes



Foot valve/strainer

Hose Accessories and Tools



Hose shutoff clamp



Spanner wrench



Gravity sock



NOZZLES AND SPRINKLERS

Twin Tip Nozzle (Forester)

Straight stream tips (50 psi)

- 3/16" tip – 7 gpm at 50 psi
- 3/8" tip – 30 gpm at 50 psi

Spray/fog tips (50 psi)

- Come in different flow rates such as 3, 6, and 8 gpm.



Adjustable Barrel Nozzle (KK and Lexan)

Available in different sizes.

- 1" provides 20 gpm at 100 psi
- 1½" provides 60 gpm at 100 psi

Rated and work most efficiently at 100 psi.



Adjustable Barrel Nozzle – Garden Hose Nozzle

- Adjustable spray or straight stream
- Attaches to 3/4" discharge hose

Sprinklers

- 360-degree coverage area
- 40 to 60 feet in diameter coverage distance





KITS

National Kits



High Pressure Portable Pump Kit



Lightweight Pump Kit

National Kits



Mop Up Kit



Sprinkler Kit

Local Geographic Kits





Review

Review

1. In a two cycle engine, where is the oil located that lubricates the engine?

Answer:

Oil is mixed with the gas.

Review

2. In a four cycle engine, where is the oil located that lubricates the engine?

Answer:

Oil is located in a separate oil reserve (crankcase).

Review

3. Why is it important for the pump operator to know how the engine is lubricated?

Answer:

To ensure the pump's engine is receiving its lubrication from the proper source, whether it be oil reservoir or mixed with the gas, to prevent damaging the engine and making the pump inoperable.

Review

4. Does a two cycle engine typically produce more or less exhaust emissions than a four cycle engine?

Answer:

More

Review

5. The fire is in a remote location (no roads), and you need a pump that can provide a lot of pressure and flow? Which types of pumps would work best?

Answer:

- **High pressure portable pump**
- **Floatable pump**
- **Lightweight portable pump**

Review

6. Identify these parts on the pump:



- **Suction inlet (intake port)**
- **Priming port**
- **Discharge port**
- **Air filter**
- **Throttle lever**
- **Spark plug**
- **Muffler**

To review parts location, click on the pump image to launch Pump Interactive.

Review

7. What is the purpose of a suction hose?

Answer:

Draft water from the water source to the pump; designed to handle vacuum.

Review

8. What is the purpose of a discharge hose?

Answer:

Carry water from the pump to the fire, portable tank, or other location; designed to handle pressure.

Review

9. One of the purposes of this appliance is to help maintain prime if foot valve isn't working correctly. What is the appliance?

Answer:

Check and bleeder valve

Review

10. The purpose of this appliance is to divide one line into two. What is the appliance?

Answer:

Gated wye valve

Review

11. What types of nozzles are these?



Answer:

Twin tip



Answer:

Adjustable barrel

Review

12. There are several pump and pump-related kits that can be ordered from the national cache. What are the names of those kits?

Answer:

- **High Pressure Portable Pump Kit**
- **Lightweight Pump Kit**
- **Mop up Kit**
- **Sprinkler Kit**

Objectives

- 1. Distinguish the differences between the two cycle and four cycle engines, and identify which one of these differences is most important to a pump operator.**
- 2. Label the parts of a commonly used portable pump.**

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